

Fluent language production can be determined by a number of linguistic factors including the ability to produce appropriate morphology, lexical retrieval, sentence production, grammatical form, and conversational discourse. Individuals with agrammatic aphasia may exhibit impaired lexical processing which greatly impedes their ability to construct sentences and communicate fluently. In particular, individuals with agrammatic aphasia exhibit difficulty in understanding or producing complex lexical items specifically in verb morphology as well as presenting with non-fluent, reduced speech lacking grammatical features, and a decrease in the production of verbs and nouns (Ballard & Thompson, 1999; Edmonds & Babb, 2011; Edmonds, Nadeau, & Kiran, 2009; Martin, Fink, & Laine, 2004; Nickels, 2002; & Raymer, & Ellsworth, 2002). Similarly, these individuals may demonstrate lexical retrieval deficits that are semantic in nature with difficulty accessing meaning and producing the correct forms of words (Libben, 2008). Also, these individuals may present difficulty both socially and linguistically processing discourse and conversation due to the nature of the interaction.

This study investigated which treatment, Script Therapy or Verb Network Strengthening Treatment (VNeST), was more beneficial in improving sentence production and conversational discourse with two individuals with agrammatic aphasia. Script therapy was chosen as it is a functional approach to aphasia therapy that can facilitate participation in personally relevant conversational activities. Structurally-based VNeST aims to improve lexical retrieval of content words in sentence context by promoting retrieval of verbs and their thematic roles (Edmonds et al., 2009). Previous studies suggest that both treatments help increase fluency in more complex sentence production that is necessary for discourse and conversation in individuals with agrammatic aphasia (Edmonds & Babb, 2011; Edmonds et al., 2009).

Methods:

The participants in this study were two males with Broca's aphasia. Participant 1 (P1) was a 78-year-old male with a graduate level education who suffered a left cerebrovascular accident (CVA) in the anterior parietal lobe 1 year prior to the study. Participant 2 (P2) was a 68-year-old male with a graduate level education who also suffered a left CVA 2 years prior to the study. Both participants were evaluated using the Western Aphasia Battery Revised (WAB-R) (Kertesz, 2006). P1 had an aphasia quotient (AQ) of 45.2 and P2 had an (AQ) of 37.5 both consistent with Broca's aphasia. Additionally, both participants were measured before treatment with the Cognitive Linguistic Quick Test (CLQT) (Helm-Estabrooks, 2001), the Boston Naming Test, (BNT) (Kaplan, Goodglass, & Weintraub, 1983), and the Apraxia Battery for Adults, (ABA) (Dabul, 2000) and Correct Information Units Coding System for Connected Speech Tasks, (Nicholas & Brookshire, 1993). The results of this battery of assessments are located in Appendix A.

Procedures:

Design: A cross-over design was used to train pre-selected target sentences with Script Therapy and VNeST. The design was modified to include pre-treatment, treatment, post-treatment, and a one month follow-up to assess maintenance.

Pre-treatment and Post-Treatment Phases: During the pre- and post-treatment phases, both participants were judged on 4 pre-treatment and 4 post-treatment tasks. The pre/post treatment tasks were measured using the elicitation samples including: procedural, personal, and single pictures, and the Cinderella Narrative (Nicholas & Brookshire, 1993). These samples were

analyzed to measure grammatical correctness (GC), mean length of utterances (MLU), and correct information units (CIUs). P1 received the Script treatment and P2 received the VNeST treatment protocol and then both participants switched treatment. Pre-treatment and post-treatment tasks obtained scripts and target sentences that were analyzed using a Systematic Analysis of Language Transcripts (SALT) (Miller & Chapman, 2005) and correct information units (CIUs) (Nicholas & Brookshire, 1993) was used to measure each participant's number of utterances and mean length of utterances after both treatment measures were applied.

Treatment Phase: Prior to the treatment phase, both participants worked in conjunction with a speech-language pathologist to develop individualized scripts on a topic that was meaningful, relevant, and matched to this participant's communication level. P1 and P2 practiced the 4 individualized scripts for three weeks each, for a total of nine weeks of treatment. Both participants were asked to practice at least 30 minutes a day, six days per week for a minimum practice time of three hours a week. The post-treatment and maintenance probes were evaluated based on the number of CIUs produced, the average MLU, and the total number of words (TNW) used in the previous 4 scripts.

During the treatment of VNeST, P1 and P2's stimuli consisted of 20 cards containing the names of 20 target verbs, six to eight cards for each verb containing three to four agents that formed three to four pairs related to each verb. Additionally, five cards containing the words who, what, where, when, and why and 12 sentences for semantic judgment and 12 sentences containing the target verb broken into four categories: correct, inappropriate agent, inappropriate patient, and thematic reversal (Edmonds & Babb, 2011). The same lists of 20 target verbs were reassessed during post-treatment and follow-up.

VNeST was administered two times per week for two one hour sessions. During treatment, P2 was asked to produce orally 15 three to four thematic pairs (e.g. carpenter and lumber) for a provided verb (e.g. measure). In this protocol, the participants were to generate three to four agent pairs, then the participants were to read each agent-patient pair aloud (the verb was not read aloud) and the participants were to choose one answer to a wh-question.

Maintenance Phase: Both participants completed a follow-up session one-month post-treatment to assess the generalization to previously trained scripts and VNeST protocols. Similarly, SALT and CIU protocols were implemented to observe changes.

Conclusions: The data for the pre-treatment, post-treatment, and follow-up phases are in Appendices B, C. P1 demonstrated an increase in the number of script phrases (n=24) produced from pre-treatment to post-treatment phases (Pre-post: 41%-44%; maintenance- 38% CIUs), but not during the maintenance phase. P2 was able to increase in the number of script phrases (n=24) from pre-treatment- to-maintenance (25%- 34%; maintenance- 35% CIUs). Both participants increased with number of thematic pairs and target verbs (n=24 target verbs) from pre- to- post treatment. P1 produced an increase in thematic pairs and verbs (Pre-Post: 23-26%; maintenance- 28% CIUs). Similarly, P2 produced an increase in thematic pairs and verbs, but a decrease in the maintenance phase of VNeST (Pre-Post: 33%-35%- maintenance-28% CIUs).

Discussions: The results of this study conclude that Script therapy was more beneficial for P2 in the maintenance phase in producing more grammatically correct phrases as well as the number of utterances and increased MLU. P1 demonstrated an increase with VNeST during the

maintenance phase where the target verbs provide more of the grammatical sentence structure to help increase the number of utterances as well as MLU. The overall results showed different responses to treatments across participants, with P1 exhibiting limiting effects and P2 exhibiting more widespread results. Perhaps, reversing the order of treatment in P1 and P2 would have produced different results. Another limitation was that the protocol for Script Therapy may have influenced the results of the VNeST. Finally, only 2 participants were used assessed in this study and both of the aphasia scores were similar. The limited number of participants may have also influenced the results of this study.